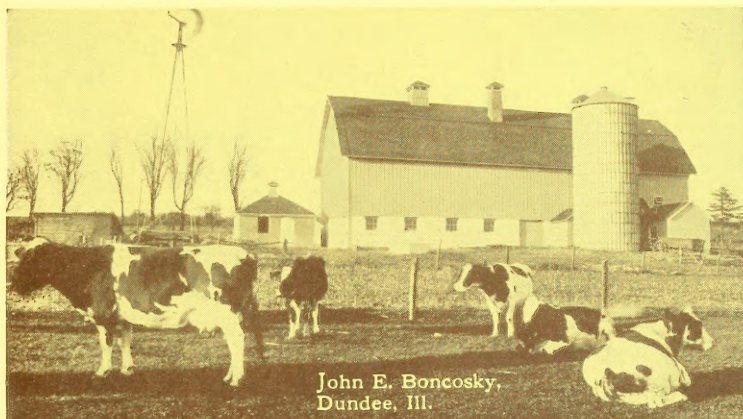


SD 195  
P6

188

# CEMENT STAVE SILOS

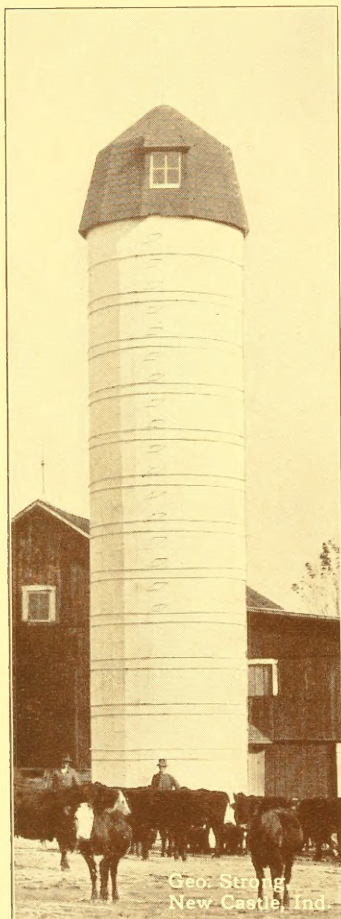


Published by  
**PORTLAND CEMENT ASSOCIATION**  
111 West Washington Street  
CHICAGO

**"CONCRETE FOR PERMANENCE"**

JUNE 1917

# CEMENT STAVE SILOS



Geo. Strong  
New Castle, Ind.

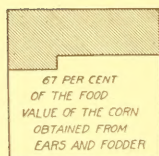
## WHY BUILD A SILO?

In these days of high land values and increasing cost of all farming operations, it is important that the farmer obtain from his crops the greatest possible feeding value per acre. He must grow forage crops that contain the highest proportion of materials which actually go to make bone, flesh and fat.

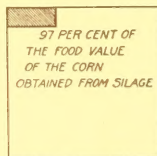
About 40 per cent of the entire feeding value of corn is in the stalks and leaves. As the corn crop is harvested on many farms, this portion of its value is lost. Is it good business to go to the expense of producing this crop, robbing the land of its valuable elements, and then losing this 40 per cent of food value by letting the stalks and leaves go to waste?

## THE SILO AND PREPAREDNESS

With rising costs of all kinds of food-stuffs and the threatened shortage which the country faces owing to worldwide conditions, it is the duty of every one to do all in his power to avoid waste and to increase production. This country cannot afford citizens who throw 40 per cent of the corn crop away. In the present national crisis, every acre of land should be made to yield its full capacity, and every human endeavor should be directed toward conservation.



1. THE OLD WAY



2. THE NEW WAY

The shaded portions represent loss

## WHAT THE SILO WILL DO

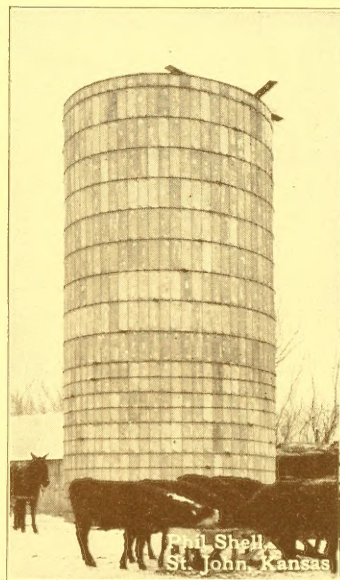
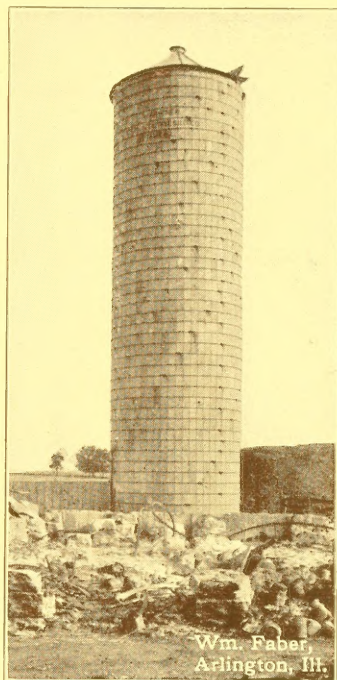
It takes a good farmer to make two blades of grass grow where one grew before. It takes a better farmer to grow two bushels of corn where formerly one bushel was grown. The farmer who can make \$2 this year where he made \$1 last year is a good business man. Any farmer can do what amounts to these very things with only a small additional investment and very little more labor. He can build a silo and save all of the corn crop and make valuable food of it for practically every farm animal.

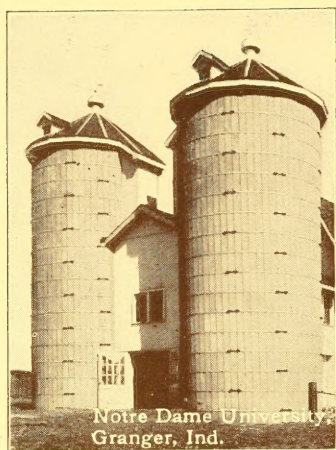
In converting corn into silage it is easy to almost double the feeding value per acre of the crop. Silage is a juicy, appetizing feed, uniform in quality at all seasons, relished by farm animals, and has a combined tonic and laxative effect upon the digestive organs.

## SILAGE FOR DAIRY COWS

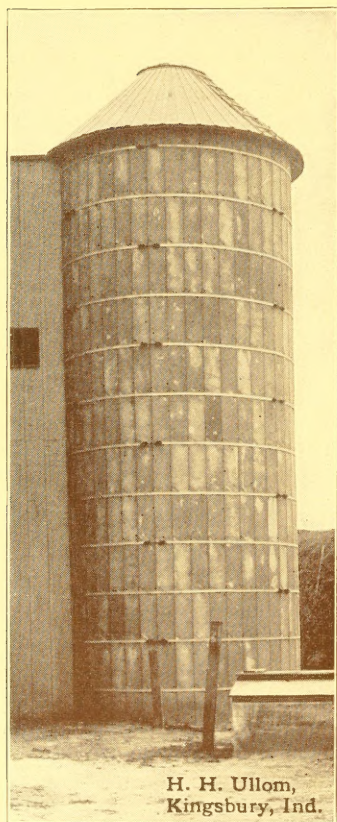
When the practice of feeding silage was new, most people thought it was good only for dairy cattle. Although there is no doubt that silage is the best roughage obtainable for dairy cows, experiments carried on in recent years by the United States Department of Agriculture and various experiment stations have proved conclusively that it can be fed with profit to almost all kinds of farm animals.

In an experiment carried on by the Ohio Agricultural Experiment Station, two groups of dairy cows producing about equal quantities of milk were fed with their grain as nearly as possible the same amount of roughage, one hay,





Notre Dame University,  
Granger, Ind.



H. H. Ullom,  
Kingsbury, Ind.

the other silage. The group that received silage produced  $15\frac{1}{2}$  per cent more milk and 11 per cent more butter fat per 100 pounds of nutrients fed. Other experiments carried on along these lines have confirmed the results of this test.

### QUANTITY OF SILAGE TO FEED

Because of its uniformity, palatability and economy, silage is the ideal feed for dairy cows. To receive the best returns from dairy cows, about 40 pounds of silage, with some dry roughage should be fed per day. Silage-fed cows keep up an even flow of milk, have a silky coat and keep in good, healthy condition at all seasons.

### SILAGE GOOD FOR FATTENING STOCK

Many farmers have not built silos because they do not wish to carry on regular feeding operations in the winter. Their idea is to buy cattle in the fall and winter them on corn fodder. As a general rule, cattle cared for in this manner will come out in the spring in just about the same condition and weight as when they started in the winter, while cattle wintered on silage, which costs no more than common corn fodder, invariably make large gains. Silage-fed cattle have that smooth hard finish, so much desired by farmers and packers.

Out of 114 answers received by the Missouri Experiment Station in reply to the question, "Do you find that it costs less to fatten a steer when silage forms a large part of the ration," 112

cattle feeders answered "Yes," while two were unable to give a positive answer.

The quantity of silage which should be fed to cattle that are being fattened depends on several conditions, such as time of year, state of market, weight of cattle and other feeds being used with silage. From 20 to 25 pounds of silage per day is usually enough.

### SILAGE FOR SHEEP

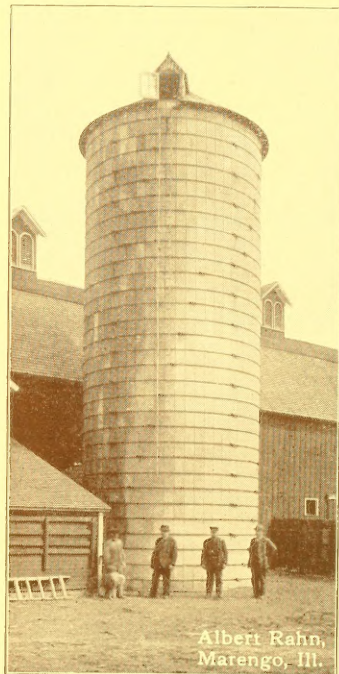
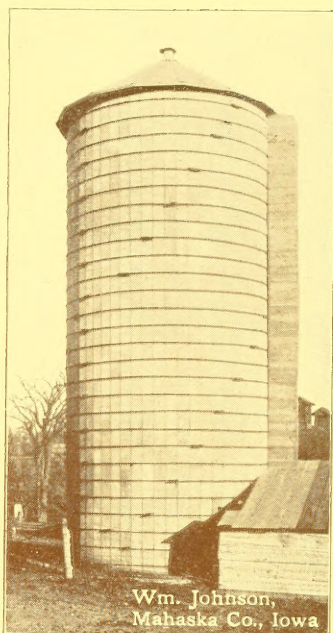
Silage may be fed to sheep with good results. As sheep require a greater variety of food than other farm animals, better results are obtained by combining such roughage as clover and alfalfa with the silage. It has been proved that the expense of feeding sheep can be greatly reduced by adding silage to their ration.

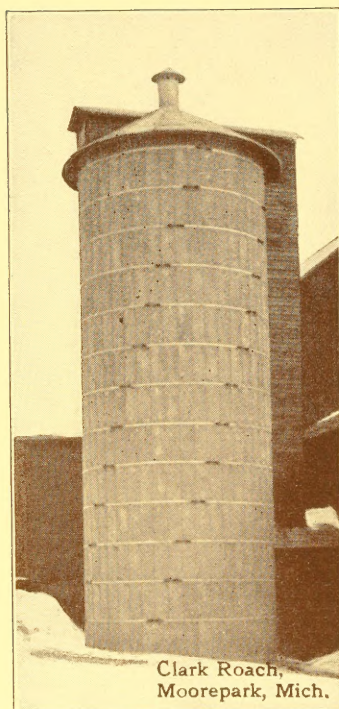
### SILAGE FOR HOGS

For hogs, silage is better as a conditioner than as a fattener. Hogs will eat it readily, but it is too bulky to produce fat when fed alone. It has been recommended very highly as feed for sows with pigs, as it will quicken the flow of milk.

### FEEDING SILAGE TO HORSES

The practice is growing of feeding silage to horses. Care should at all times be taken that no frozen or moldy silage is given them. Silage is not rich enough in nutrients to be used as the only feed for work horses. Grain should be given with it. Colts and horses that are not worked through the





Clark Roach,  
Moorepark, Mich.

winter can be successfully carried through on silage and straw. This is economical feeding and if carefully done, invariably takes the stock through the winter in splendid condition. About 8 or 10 pounds of silage per day is all that should be fed.

## What kind of a Silo?

As the economy of feeding silage depends in part upon the efficiency of the silo, it is necessary that the silo be

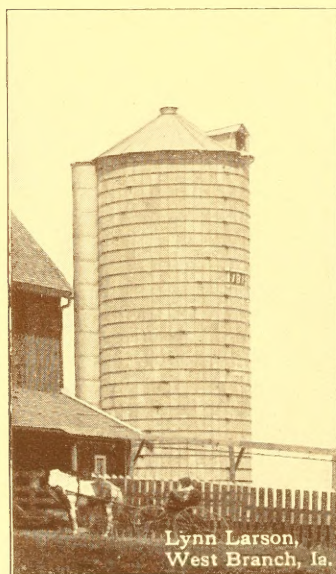
*Airtight*  
*Waterproof*  
*Ratproof*  
*Windproof*  
*Fireproof*  
*Permanent*

## AIRTIGHTNESS

No doubt the most important requirement is that the silo be airtight. Silage spoils owing to bacterial action, which cannot take place unless air is present. CEMENT STAVE SILOS are so built that it is impossible for air to reach the silage through the walls.

## WATERTIGHTNESS

It is necessary that the walls of a silo be watertight not only to prevent entrance of water from the outside, but to prevent silage juices from escaping. The individual staves of which the cement stave silo is made are watertight and when laid up the joints between them are sealed in such a manner that there is no leakage.



Lynn Larson,  
West Branch, Ia.

Cement staves have been successfully used for building water tanks of moderate height.

### RATPROOFNESS

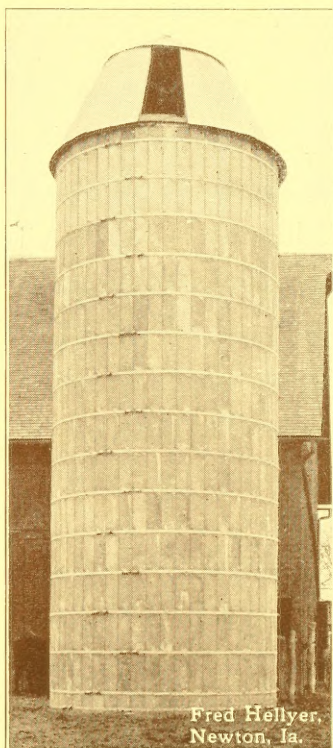
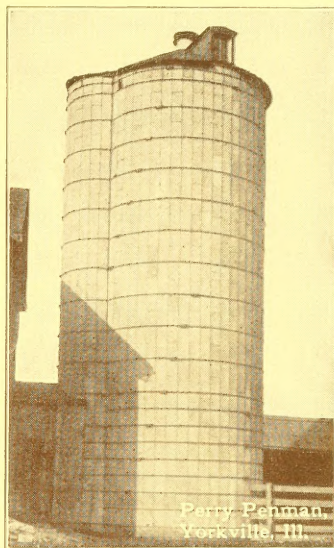
Rats and mice will gnaw their way into some silos, if possible, to nest in the silage. The holes which they make allow air to enter and result in considerable silage being spoiled. Rats and mice cannot gnaw through concrete.

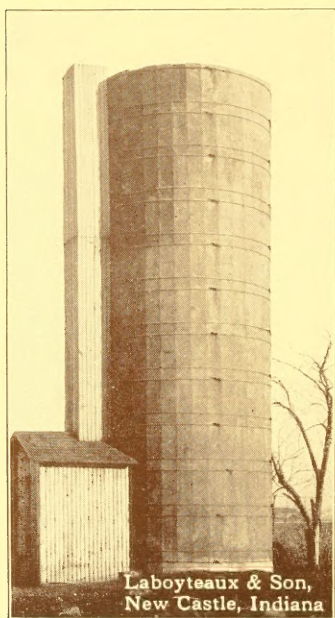
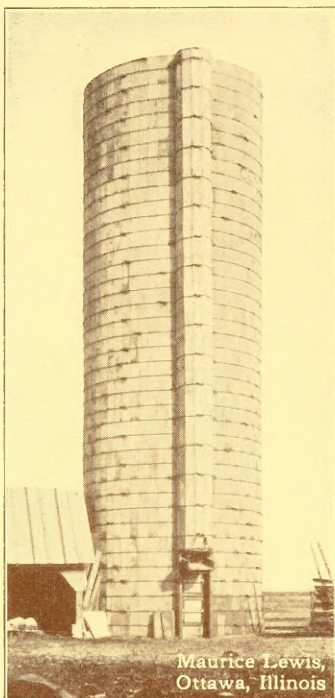
### WINDPROOFNESS

Cement stave silos are windproof. They have withstood tornadoes which have leveled other silos and all surrounding structures. The weight of the cement stave silo is a great point in its favor. There is no need to tighten or loosen hoops. It is unnecessary to attach guy wires to keep it from blowing over. Once properly erected, the cement stave silo is up for all time.

### FIREPROOFNESS

On the average farm there are few means of fighting fire, therefore a silo should be fireproof. Cement stave silos have successfully withstood very severe fires. If they are built with a concrete chute, not a pound of silage need be lost through exposure to fire. A cement stave silo will protect the store of winter feed against such happenings. After a dry season when other feeds are very expensive and the farmer has nothing that can be substituted for his silage, its loss means far more than its ordinary actual value.





There are many instances on record where the burning of a silo has not only cost the owner his silo and its valuable contents but has made it necessary for him to sell his stock because of having no feed, and consequently has driven him out of business for a season or two. A cement stave silo will make certain that your dairy plant can be operated without interruption.

### PERMANENCE

Cement stave silos are permanent. Many of them built twelve years ago are in as perfect condition today as when new. Concrete grows stronger and tougher with age. There is no outlay for upkeep and repairs, no painting, no mortar joints to fill, no holes to patch. A cement stave silo on your farm will make large returns yearly for no one knows how many years.

### EASE OF CONSTRUCTION

One of the many points in favor of the cement stave silo is the ease and speed with which it can be built. Four men are usually required to do the work—two above, one to set the staves, and the other to follow and plumb them, while two men below hoist the staves and help with scaffolding.

Common types of cement silo staves are 28 to 30 inches long, 10 to 12 inches wide, and  $2\frac{1}{2}$  to 3 inches thick. There is some variation of method prevailing among the different stave manufacturers or systems of building stave silos in joining the staves together; but

as all of these methods are being used with reasonable satisfaction, the slight differences are not of great consequence, and occasionally give an intending purchaser the opportunity to select a type which most appeals to his personal fancy.

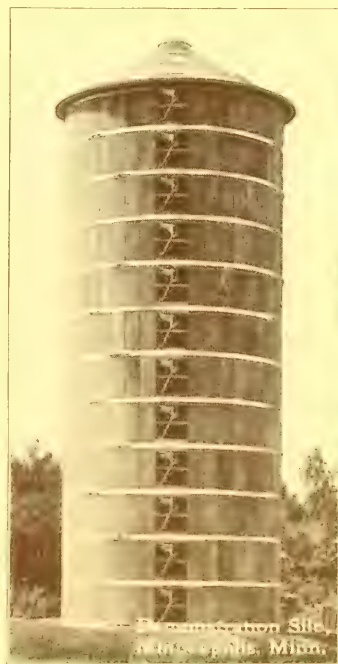
## ERECTING THE SILO

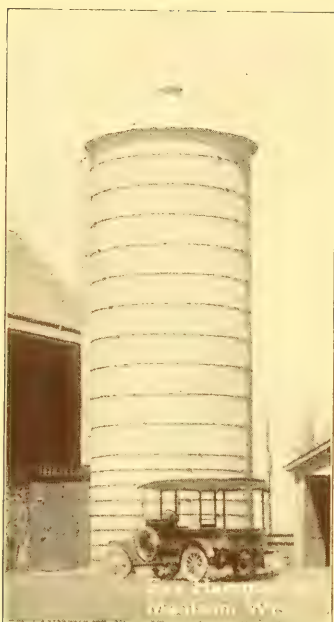
Excavation for the foundation is made to a point below possible frost penetration to prevent the structure from heaving by frost action. A solid concrete foundation is then put in, usually so that the floor of the silo will be not more than 4 feet below ground level. This depth is considered most satisfactory, as it is not too deep for convenient removal of the silage for feeding.

In the first course of staves set upon the foundation, full and part length staves are alternated. This starts the breaking of joints which is maintained to the top row and which is finished with alternate full and part length staves. As each course of staves is placed in position, a steel band or hoop is put on and tightened. After all of the staves have been set, the hoops are again tightened to take up any remaining slack. The inside wall of the silo is then painted with a thick cement and water wash. This fills any water pockets on the surfaces of the staves and seals the seam between adjoining staves, giving a smooth, even, airtight and watertight surface.

## CONTINUOUS DOORWAYS

Cement stave silos can be built with





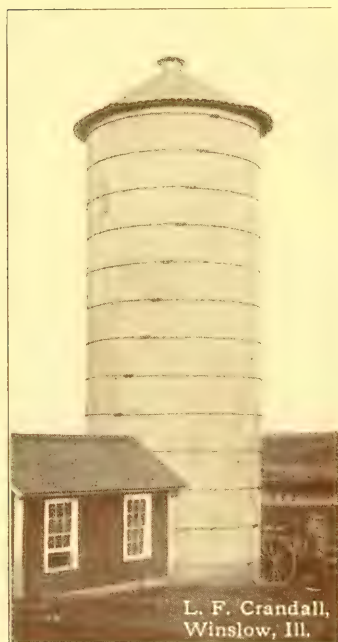
continuous doorways from top to bottom without weakening the structure. Specially designed door frames of concrete or steel are used, and both types have given excellent satisfaction. Door openings are usually about 24 by 30 inches, which allows plenty of room to get in to remove the silage. Convenient ladder steps are provided and doors fit tightly into door frames so as to keep out air.

### QUICK ERECTION

A cement silo can be built in less time than any other type of masonry silo. An average size is usually built complete in three days, although in many cases where all conditions have been favorable they have been built in two days. The staves may be hauled by the farmer any time when he is not busy. The silo crew is on the farm only a short time and does not interfere with the regular farm routine.

### GUARANTEE

There are hundreds of cement stave silos in the central western states, which have been giving perfect satisfaction for periods up to twelve years. The cement stave silo is manufactured of home materials and by home labor, and erected by a home contractor who must depend upon local business and therefore stakes his reputation on his work right in your neighborhood. The buyer hauls the material to his farm and the contractor sends his expert crew to erect the silo. This not only relieves the farmer of building but makes it possible for the cement stave



L. F. Crandall,  
Winslow, Ill.

silo contractor to give the farmer a real guarantee covering workmanship and materials and thus to protect him against loss.

### CEMENT STAVE CHUTE

At slight additional expense a cement stave silo can be equipped with a cement stave chute which is also fire-proof and will protect the silo doors from fire. The cement stave chute is a feature of all new cement stave silos and can readily be attached to silos now in use. A permanent chute adds greatly to the appearance of the structure and is an economical and inexpensive addition.

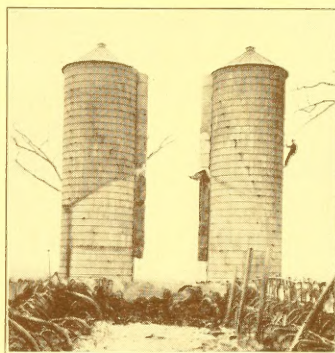
### YOU CAN AFFORD A CEMENT STAVE SILO

Any farmer can afford a cement stave silo. There is no upkeep expense such as painting and repairs. There is thorough protection against wind, rot, rats and fire. A good silo makes a farm more salable and marks the owner as a progressive farmer. A cement stave silo never fails to increase the farm income.

For economy, profit and permanence, why not build a CEMENT STAVE SILO ?



*Before the Fire*



*After the Fire  
Silos Unharmed  
Because Built of  
Concrete—  
Silage Undamaged*

*Several hundred Cement Products Plants now build Cement Stave Silos. If you do not know a contractor who builds Cement Stave Silos in your neighborhood, write to the FARM BUREAU of the PORTLAND CEMENT ASSOCIATION.*



## Capacity of Round Silos in Tons

| *Height  | Diameters |         |         |          |          |          |
|----------|-----------|---------|---------|----------|----------|----------|
|          | 10 ft.    | 12 ft.  | 14 ft.  | 16 ft.   | 18 ft.   | 20 ft.   |
| 27 ½---- | 41 tons   | 55 tons | 80 tons | 100 tons | 130 tons | 160 tons |
| 30 ----  | 47 "      | 65 "    | 91 "    | 120 "    | 150 "    | 187 "    |
| 32 ½---- | 51 "      | 75 "    | 100 "   | 131 "    | 167 "    | 207 "    |
| 35 ----  | 58 "      | 85 "    | 115 "   | 150 "    | 190 "    | 235 "    |
| 38 ½---- | 63 "      | 95 "    | 125 "   | 162 "    | 205 "    | 255 "    |
| 40 ----  | 70 "      | 101 "   | 140 "   | 180 "    | 225 "    | 280 "    |
| 42 ½---- | -----     | 110 "   | 150 "   | 195 "    | 245 "    | 300 "    |
| 45 ----  | -----     | 120 "   | 180 "   | 215 "    | 270 "    | 330 "    |
| 47 ½---- | -----     | -----   | -----   | 230 "    | 285 "    | 355 "    |
| 50 ----  | -----     | -----   | -----   | -----    | 310 "    | 382 "    |

\* Heights are given in intervals of 2½ feet, the length of most common types of cement staves.



## Portland Cement Association

General Offices

111 West Washington Street, Chicago

Offices at

ATLANTA  
Hurt Building

DALLAS  
Southwestern Life Building

DENVER  
Ideal Building

INDIANAPOLIS  
Merchants Bank Building

KANSAS CITY  
Rialto Building

MILWAUKEE  
First National Bank Building

NEW YORK  
101 Park Avenue

PARKERSBURG, W. VA.  
Union Trust Building

PITTSBURGH  
Farmers Bank Building

SALT LAKE CITY  
Kearns Building

SAN FRANCISCO  
Rialto Building

SEATTLE  
Northern Bank & Trust Bldg.



LIBRARY OF CONGRESS



00027661270



Hollinger Corp.  
pH 8.5